PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	08.09.2004

Applicant's or agent's file reference 2002P11288WO	**IMPORTANT NOTIFICATION**

International application No. PCT/EP 02/07860	International filing date *(day/month/year)* 15.07.2002	Priority date *(day/month/year)* 15.07.2002 (30 :) 15-1-04

Applicant

SIEMENS AKTIENGESELLSCHAFT et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

   The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

   Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

   For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

   The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Finnie, A Tel. +49 89 2399-8251

Form PCT/PEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2002P11288WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP 02/07860	International filing date (day/month/year) 15.07.2002	Priority date (day/month/year) 15.07.2002

International Patent Classification (IPC) or both national classification and IPC
H04L12/28

Applicant
SIEMENS AKTIENGESELLSCHAFT et al.

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

  ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

  These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

  I   ☒ Basis of the opinion
  II ☐ Priority
  III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  IV ☐ Lack of unity of invention
  V   ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  VI ☐ Certain documents cited
  VII ☐ Certain defects in the international application
  VIII☐ Certain observations on the international application

Date of submission of the demand 11.11.2003	Date of completion of this report 08.09.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Grimaldo, M Telephone No. +49 89 2399-7513

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)):*

Description, Pages

2-8	as originally filed
1, 1a	filed with telefax on 19.04.2004

Claims, Numbers

1-8	filed with telefax on 19.04.2004

Drawings, Sheets

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description,   pages:

   ☐ the claims,   Nos.:

   ☐ the drawings,   sheets:

5. ☐   This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-8
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-8
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-8
	No:	Claims	

2. Citations and explanations

    see separate sheet

Cited documents

The following documents (D) are cited in the search report; the numbering will be adhered to throughout the procedure:

D1:   WO 01/06732 A (BRITISH TELECOMM ;NEILL ALAN WILLIAM O (GB); CORSON MATHEW SCOTT () 25 January 2001 (2001-01-25)

D2:   "MPLS-AN INTRODUCTION TO MULTIPROTOCOL LABEL SWITCHING" WHITE PAPER NORTEL NETWORKS, XX, XX, April 2001 (2001-04), pages 1-12, XP002950989

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1.   Mobile IP and MPLS (Multi Protocol label switching) are emerging technologies. In order to offer mobile IP services in a network, which has been engineered for MPLS, network operators are dealing with the problem of convergence between the two technologies.

The simplest approach is to deploy both technologies independently of each other: MPLS tunnels for engineering purposes and IP tunnels for mobile IP supporting.

An alternative approach is a loose coupling between MPLS and mobile IP: home agent and label edge router would reside on the same network node without direct interacting between these two components.

Independent method claim 1 provides an alternative method with a thigh coupling between an existing static MPLS infrastructure and IP mobility services for transferring IP packets.

The method comprises label switched paths configured in advance based on mechanisms, like traffic engineering, and a modified home agent including label edge router capability. Packets are forwarded to a mobile host in a visited network exclusively by means of label switched paths, which interconnect mobility home and foreign agents. Thus for new mobility bindings in the home agent no creation or modification of label switched paths is required.

Document D2, considered the closest prior art, discloses a multiprotocol label

switching wherein the MPLS nodes an agent sends a data packet to a further node.

However, document D2 does not use preconfigured paths, but forward on a hop by hop basis and does not examine whether a preconfigured path from the home agent to the foreign agent exists but it calculates for all possible not pre-configured paths which one is the shortest, i.e. it predetermines paths but does not use preconfigured route.

In view of these considerations, it seems that the subject-matter of claim 1 is novel and inventive (Article 33(1)-(3) PCT).

2. Claims 2-7 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step (Article 33(1)-(3) PCT).

3. Independent claim 8 (home agent) although phrased as an apparatus is nevertheless a repetition of the subject-matter of method claim 1 and hence also meet the requirements of novelty and inventive step (Article 33(1)-(3) PCT).

Certain observations on the international application

4. A claim's subject-matter should be defined in terms of positive features indicating that certain technical elements are present. As a consequence the expression used in claim 6 "functional entities ... are co-located but not correlated ...." should be avoided (Article 84 EPC).

1

"Home agent optimization for handling mobile IP and static
label switched paths"

The invention concerns a method and an optimized home agent
5   for transfer of IP datagrams over a path from a sender over
a radio access network to a mobile host.

WO 01 06732 A discloses a method for transfer of data over a
path from a sender over a radio access network to a mobile
10 host.
"MPLS-an introduction to multiprotocol label switching" white
paper Nortel networks, , April 2001 (2001-04), pages 1-12, XP
002950989 discloses a multiprotocol label switching protocol
(MPLS), wherein an MPLS node agent sends a data packet to a
15 further node.

The Mobile IP protocol is a concept to deal with user
mobility issues for transport of IP related services. As a
prerequisite the access network as well as the core network
20 use IP as the network layer protocol and are capable to run
the mobile IP protocol in addition. The network architecture
for mobile IPv4 includes home agents and foreign agents to
build forwarding IP tunnels, when a mobile host moves out of
the home network to attach to a different access point for
25 requesting services from a network. The foreign agent
represents the default router for a mobile host, if it is
attached to an access point outside the home network. When a
correspondent node sends packets to a mobile host currently
registered at a different location, the home agent intercepts
30 all packets for that host and reroutes them to the new
location. The home agent's binding cache contains rerouting
information for all mobile hosts currently attached to

different access points. The care-of-address specifies the
mobile node's temporarily acquired host address after
registering at a different location.

5   Using IP tunnels between home agent and foreign agent becomes
     inefficient, if the transport network already provides
     alternative tunneling mechanisms to interconnect various
     access points. The MPLS called label switching approach
     offers support for IP traffic engineering by introduction of

9

Claims

1. Method for transfer of an IP packet over a path from a
   sender (CN 13) over a radio access network (BS 6, HA 15,
5   FA 11) to a mobile host (MS 2),

   characterized in that, when a home agent (HA 15) receives
   an incoming data packet determined for a mobile host (MS
   2) with a destination address (MS2-address 137.21.16.5),
10   the home agent (HA 15) examines if there is a match
   between the destination address (MS2-address: 137.21.16.5)
   of the packet and a subnetwork address (FA 11-address:
   137.21.16.0) of a foreign agent (FA 11) listed in a list
   of subnetwork addresses (137.21.16.0; 137.22.25.0) stored
15   at the home agent (HA),

   wherein, if there is a match between the destination
   address (MS2-address: 137.21.16.5) and a subnetwork
   address (FA 11-address: 137.21.16.0) of a foreign agent,
20   the home agent examines whether a preconfigured path from
   the home agent (HA 15) to this foreign agent exists and
   wherein the home agent (HA 15) sends the packet to this
   foreign agent (FA 11) on this preconfigured label switched
   path (37) if a label switched path (37) to this foreign
25   agent exists.

2. Method according to claim 1, wherein the home agent (HA
   15) sends the packet to this foreign agent (FA 11) on this
   preconfigured label switched path (37) by sending the
30   packet over a port of a forwarding interface (eth0) of the
   home agent (HA 15) which port is used for the path with

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this path number (37).

3. Method according to any of the preceding claims, wherein
   the home agent (HA 15) examines if there is a match
5 between the destination address (MS2-address: 137.21.16.5)
   of the packet and a subnetwork address (FA 11-address:
   137.21.16.0) of a foreign agent (FA 11) only if there is
   an entry (MS2-address: 137.21.16.5) in a binding cache of
   the home agent (HA 15) which entry corresponds to the
10 destination address (MS2-address: 137.21.16.5) of the
   incoming packet.

4. Method according to any of the preceding claims, wherein a
   handover of a mobile host (MS1) from one foreign agent to
15 an other foreign agent is done without creating or
   modifying a path between the foreign agent and a home
   agent of this mobile host.

5. Method according to any of the preceding claims, wherein
20 the path (37) is a preconfigured, statically administered,
   multipurpose label switched path.

6. Method according to any of the preceding claims, wherein
   the functional entities of mobile IP and multipurpose
25 label switching MPLS are co-located but not correlated in
   a foreign agent (FA 11).

7. Method according to any of the preceding claims, wherein a
   foreign agent (FA 11) and a home agent (HA 15) are packet
30 switched nodes of an IP network.

11

8. Home agent (HA 15),

   characterized in that it comprises

   -a memory containing a list of subnetwork addresses

   (137.21.16.0; 137.22.25.0) of foreign agents,

5   - a comparing means for comparing the destination address

   of an incoming data packet determined for a mobile host

   (MS2) with stored subnetwork addresses (137.21.16.0;

   137.22.25.0) of foreign agents (FA 11, FA 12) for

   determining the foreign agent (FA 11) to which the packet

10   is to be sent,

   -a means for determining a path (37) for transmission of

   the packet to the foreign agent (FA 11) by comparing the

   determined foreign agent (FA 11) address (137.21.16.0)

   with stored addresses (137.21.16.0; 137.22.25.0) of

15   foreign agents (FA 11, FA 12), between which foreign

   agents (FA 11, FA 12) and the home agent (HA 15) paths

   (37, 62) exist,

   -an interface (eth0) for transmitting a packet to a

   determined foreign agent (FA 11) on a determined,

20   preconfigured path (37).